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**Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Army** **Date:** May 2017

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement & Dev							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018 Base</b>	<b>FY 2018 OCO</b>	<b>FY 2018 Total</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	0.000	8.000	10.064	-	10.064	26.103	24.503	17.373	13.770	Continuing	Continuing
EW9: Aviation Rocket System Product Improvement and Dev	-	0.000	8.000	10.064	-	10.064	26.103	24.503	17.373	13.770	Continuing	Continuing

## **A. Mission Description and Budget Item Justification**

The Aviation Rockets Product Improvement and Development line will fund the development, integration and test of new munitions to meet user requirements. Additionally, it will fund a range of improvement initiatives to modernize the Hydra-70 2.75 Inch rocket and launcher system to include improvements to performance, safety, reliability, transportability, producibility, affordability and Insensitive Munitions (IM) compliance. The current Hydra-70 2.75 inch rocket system is more than 50 years old and is in need of performance improvements to comply with 1) USC - Title 10, Chapter 141, Section 2389, 2) DoD Directive 5000.1, CJCS Instruction 3170.01C, USD (AT&L) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to IM Requirements", and 3) existing/emerging HQDA G-3/5/7 and TRADOC aviation weapon requirements for guided and unguided rocket systems. Improvements will include design, qualification and integration of precision guidance capability, increased lethality, improved target suppression, increased standoff range, reduced minimum engagement range, improved pre-launch constraints and munitions communications/programmability, increased stowed kills, increased product reliability, improved hardness against unplanned stimuli, reduced war fighter workload, and reduced environmental impact for both manned and unmanned applications.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018 Base</b>	<b>FY 2018 OCO</b>	<b>FY 2018 Total</b>
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	8.000	10.064	-	10.064
Total Adjustments	0.000	8.000	10.064	-	10.064
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	0.000	8.000	10.064	-	10.064

## **Change Summary Explanation**

The Aviation Rockets Product Improvement and Development line will fund the development, integration and test of new munitions to meet user requirements. Additionally, it will fund a range of improvement initiatives to modernize the Hydra-70 2.75 Inch rocket and launcher system to include improvements to performance, safety, reliability, transportability, producibility, affordability and Insensitive Munitions (IM) compliance.

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Army										Date: May 2017		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement & Dev				Project (Number/Name) EW9 / Aviation Rocket System Product Improvement and Dev			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
EW9: Aviation Rocket System Product Improvement and Dev	-	0.000	8.000	10.064	-	10.064	26.103	24.503	17.373	13.770	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Aviation Rockets Product Improvement and Development line will fund the development, integration and test of new munitions to meet user requirements. Additionally, it will fund a range of improvement initiatives to modernize the Hydra-70 2.75 Inch rocket and launcher system to include improvements to performance, safety, reliability, transportability, producibility, affordability and Insensitive Munitions (IM) compliance. The current Hydra-70 2.75 inch rocket system is more than 50 years old and is in need of performance improvements to comply with 1) USC - Title 10, Chapter 141, Section 2389, 2) DoD Directive 5000.1, CJCS Instruction 3170.01C, USD (AT&L) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to IM Requirements", and 3) existing/emerging HQDA G-3/5/7 and TRADOC aviation weapon requirements for guided and unguided rocket systems. Improvements will include design, qualification and integration of precision guidance capability, increased lethality, improved target suppression, increased standoff range, reduced minimum engagement range, improved pre-launch constraints and munitions communications/programmability, increased stowed kills, increased product reliability, improved hardness against unplanned stimuli, reduced war fighter workload, and reduced environmental impact for both manned and unmanned applications.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018 Base</b>	<b>FY 2018 OCO</b>	<b>FY 2018 Total</b>
<b>Title:</b> Advanced Precision Kill Weapon System (APKWS)	-	-	3.536	-	3.536
<b>Description:</b> These funds will be used to optimize APKWS integration on the Apache and for activities required to obtain an Army Full Materiel Release (FMR) for APKWS II. This effort will include design and build of all-up-round (AUR) containers and test assets, conduct environmental qualification testing, perform ground firings, update aviation platform software, support Apache weapon survey firings, provide technical support to platform integration and testing, and development and revision of training/maintenance materiel.					
<b>FY 2018 Base Plans:</b> Begin FMR efforts and analysis needed to optimize fire control integration on the AH-64 for guided variants.					
<b>Title:</b> Modernized Rocket Launcher Increment 1	-	-	2.930	-	2.930
<b>Description:</b> This effort will provide the HYDRA launcher the capability to interface with aircraft using the current and future MIL-STD-1760 design specification. This redesign effort will include the development of a Hydra Launcher Electronic Assembly (HYLEA) that utilizes a new, non-proprietary, open systems architecture design allowing easy compatibility when integrating aircraft that are compatible with the 1760 standard. The inherent					

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
flexibility of a common HYLEA affords opportunities for additional launcher configurations and will serve as a building block for future small air to ground weapon systems.						
<b>FY 2018 Base Plans:</b> The focus of the FY2018 MRL Inc. 1 effort is to complete the final design and development of the HYLEA software and hardware efforts, Conduct a full MRL inc1 CDR, Develop test assets (XM906 launcher), Conduct a full Qualification and demonstration effort, support Apache weapons integration, and provide program management, contract, and OGA support.						
<b>Title:</b> Insensitive Munitions (IM) Compliance <b>Description:</b> Incorporation of IM-compliant explosives and design features into the Hydra-70 Rocket System to increase system insensitivity to unplanned stimuli.  <b>FY 2018 Base Plans:</b> 1. Qualify the XM283 Warhead / XM1165 Fuze for fielding in place of the M151, achieving warhead compliance with Fast Cook Off, Slow Cook Off, and Bullet Impact IM requirements. 2. Begin transition of demonstrated venting technology to production MK66 motor and associated containers to achieve compliance with Fast Cook Off and Slow Cook Off IM requirements.		-	-	2.000	-	2.000
<b>Title:</b> Smart Digital Interface <b>Description:</b> The Smart Digital Interface program is an effort to support the future smart, two-way digital communications capability to be included in the fully capable Integrated Munitions Launcher (IML). This effort will evaluate launcher-to-munitions physical interfaces for the fully capable smart munitions and launcher system to reduce both programmatic and technical risk as well as to inform requirements for a government owned, non-proprietary physical interface definition.  <b>FY 2018 Base Plans:</b> Complete the program phase 1 physical interface candidate evaluation, interface asset availability determination, and interface concept selection. Begin the phase 2 test asset development/procurement and testing.		-	-	1.598	-	1.598
<b>Title:</b> Penetrating Warhead <b>Description:</b> These funds will be used test and qualify/integrate a penetrating warhead on AH-64 Apache to include development of required improvements. This effort will include design and build of all-up-round (AUR) containers and test assets, conduct environmental qualification testing, perform ground firings, update aviation		-	8.000	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> FY 2018 Army				<b>Date:</b> May 2017	
<b>Appropriation/Budget Activity</b> 2040 / 7		<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement & Dev		<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev	

  

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018 Base</b>	<b>FY 2018 OCO</b>	<b>FY 2018 Total</b>
platform software, support Apache weapon survey firings, provide technical support to platform integration and testing, and development and revision of training/maintenance materiel.					
<b>FY 2017 Plans:</b> 1. Perform munition testing and initiate platform integration activities for a penetrating warhead on AH-64. 2. Begin development of penetrating warhead AUR container					
<b>Accomplishments/Planned Programs Subtotals</b>	-	8.000	10.064	-	10.064

  

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018 Base</b>	<b>FY 2018 OCO</b>	<b>FY 2018 Total</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• E37300: Rockets Hydra, All Types	171.193	140.064	161.155	75.820	236.975	92.088	76.818	50.100	80.569	1,746.001	2,593.808
<b>Remarks</b>											
<b>D. Acquisition Strategy</b>											
The Acquisition Strategy is to utilize in-house expertise, Other Government Agencies expertise and to execute Cost Plus Fixed Fee Engineering Services contracts. The strategy allows for the Government to have the ability to support urgent operational needs and to support unanticipated incidents, which require immediate and expert attention. Each product will have an individual strategy developed in a timely manner. This strategy will allow for the Government to maintain the capability of the Hydra-70 All-Up-Round Rocket, its variants, and Small Guided Munitions requirements.											
<b>E. Performance Metrics</b>											
N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Army												Date: May 2017			
Appropriation/Budget Activity 2040 / 7						R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement & Dev				Project (Number/Name) EW9 / Aviation Rocket System Product Improvement and Dev					
Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering/ Project Management	SS/ Various	ARSGM Product Office : Redstone Arsenal, AL	0.000	-		1.200		0.507		-		0.507	Continuing	Continuing	0.000
Subtotal			0.000	-		1.200		0.507		-		0.507	-	-	0.000
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Advance Kill Precision Munitions System (APKWS)	MIPR	AMRDEC : Redstone Arsenal, AL	0.000	-		-		2.944	Nov 2017	-		2.944	Continuing	Continuing	0.000
Modernized Rocket Launcher Increment 1	MIPR	AMRDEC : Redstone Arsenal, AL	0.000	-		-		2.197	Nov 2017	-		2.197	Continuing	Continuing	0.000
Insensitive Munitions (IM) Compliance	SS/CPFF	GDOTS : Wilimington, VT	0.000	-		-		1.710	Nov 2017	-		1.710	Continuing	Continuing	0.000
Smart Digital Interface	MIPR	AMRDEC : Redstone Arsenal, AL	0.000	-		-		0.500	Nov 2017	-		0.500	Continuing	Continuing	0.000
Penetrating Warhead	MIPR	Various : Various Performers	0.000	-		4.700		-		-		-	Continuing	Continuing	0.000
Subtotal			0.000	-		4.700		7.351		-		7.351	-	-	0.000
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Research Studies	MIPR	AMRDEC : Redstone Arsenal, AL	0.000	-		0.700		0.415	Nov 2017	-		0.415	Continuing	Continuing	0.000
Subtotal			0.000	-		0.700		0.415		-		0.415	-	-	0.000

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Appropriation/Budget Activity 2040 / 7						R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement & Dev				Project (Number/Name) EW9 / Aviation Rocket System Product Improvement and Dev					
Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Confidence Testing	C/Various	TBD : TBD	0.000	-		1.400		1.791	Nov 2017	-		1.791	Continuing	Continuing	0.000
Subtotal			0.000	-		1.400		1.791		-		1.791	-	-	0.000
			Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	-		8.000		10.064		-		10.064	-	-	-
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Army																								Date: May 2017				
Appropriation/Budget Activity												R-1 Program Element (Number/Name)								Project (Number/Name)								
2040 / 7												PE 0607142A / Aviation Rocket System Product Improvement & Dev								EW9 / Aviation Rocket System Product Improvement and Dev								
Event Name	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
APKWS									██																			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> FY 2018 Army			<b>Date:</b> May 2017
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement & Dev	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
APKWS	1	2018	1	2020
Moderized Rocket Launcher Increment 1	1	2018	1	2020
Hydra-70 Improvements	1	2019	1	2028
Insensitive Munitions (IM) Compliance	1	2018	4	2020
Smart Digital Interface	1	2018	1	2020
Penetrating Warhead	3	2017	4	2019